REVISTA BRASILEIRA DE MEDICINA DE FAMÍLIA E COMUNIDADE
RBMFC

www.rbmfc.org.br
ISSN 2179-7994

Research Articles

Leptospirosis infections occurred during the floods of May 2024 in Rio Grande do Sul

Infecções por leptospirose ocorridas durante as enchentes de maio de 2024 no Rio Grande do Sul

Infecciones por leptospirosis ocurrieron durante las inundaciones de mayo de 2024 en Rio Grande do Sul

Adilson de Souza Borges[1], Adriana Richit[2]

[1]Universidade do Contestado – Concórdia (SC), Brazil.
[2]Universidade Federal da Fronteira Sul – Erechim (SC), Brazil.

Abstract

Introduction: Periods of heavy rainfall cause flooding in the Southern Region of Brazil. In this context, diseases such as leptospirosis increase the risk of infection. **Objective:** To investigate the incidence of leptospirosis infections and deaths during the environmental disaster, related to flooding, that occurred in the state of Rio Grande do Sul in May, 2024. **Methods:** The empirical material was based on data provided by the official Government of Rio Grande do Sul website and analyzed through a quantitative approach. **Results:** The data show an approximate exponential increase of 350% in infections and 150% in deaths due to leptospirosis during this period, compared to the estimated monthly average of the disease in 2023. Additionally, the data highlight that all individuals who died from the infection were male. **Conclusions:** It is evident that, in general, society and urban centers are not prepared for floods and large volumes of rainfall.

Keywords: Leptospirosis; Floods; Environment; Environmental disasters; Health.

Corresponding author:
Adilson de Souza Borges
E-mail: adilsonsb@hotmail.com
Financing source:
Financial Assistance Program for Higher Education Students of Santa Catarina – Free University Program.
CEP Report:
Not applicable.
ICF:
Not applicable.
Provenance:
Not commissioned.
Peer review:
externa.
Received on: 06/05/2024.
Approved on: 02/02/2025.

How to quote: Borges AS, Richit A. Infecções por leptospirose ocorridas durante as enchentes de maio de 2024 no Rio Grande do Sul. Rev Bras Med Fam Comunidade. 2025;20(47):4334. https://doi.org/10.5712/rbmfc20(47)4334

Resumo

Introdução: Períodos de chuvas intensas causam enchentes na Região Sul do Brasil. Nesse contexto, doenças como a leptospirose elevam os riscos de infecção. **Objetivo:** Investigar a incidência de infecções e óbitos por leptospirose durante o desastre ambiental, relacionado às enchentes, ocorrido no estado do Rio Grande do Sul, em maio de 2024. **Métodos:** O material empírico foi constituído a partir de dados disponibilizados no portal oficial do Governo Estadual do Rio Grande do Sul e discutido em uma abordagem quantitativa. **Resultados:** Os dados evidenciam um aumento exponencial aproximado de 350% de infecções e de 150% de óbitos por leptospirose no período, em comparação com a média mensal estimada da doença no ano de 2023. Além disso, os dados evidenciam que os homens constituem a totalidade de indivíduos que foram a óbito pela infecção. **Conclusões:** É possível constatar que, de um modo geral, a sociedade e os centros urbanos não estão preparados para as enchentes e grandes volumes de precipitação pluviométrica.

Palavras-chave: Leptospirose; Enchentes; Meio ambiente; Desastres ambientais; Saúde.

Resumen

Introducción: Los períodos de lluvias intensas causan inundaciones en la región sur de Brasil. En este contexto, enfermedades como la leptospirosis aumentan el riesgo de infección. **Objetivo:** Investigar la incidencia de infecciones y muertes por leptospirosis durante el desastre ambiental relacionado con las inundaciones ocurrido en el estado de Rio Grande do Sul en mayo de 2024. **Métodos:** El material empírico se constituyó a partir de datos disponibles en el portal oficial del Gobierno del Estado de Rio Grande do Sul y se analizó mediante un enfoque cuantitativo. **Resultados:** Los datos evidencian un aumento exponencial aproximado del 350% en infecciones y del 150% en muertes por leptospirosis en el período, en comparación con la media mensual estimada de la enfermedad en 2023. Además, los datos muestran que los hombres constituyen la totalidad de los individuos que fallecieron debido a la infección. **Conclusiones:** Es posible constatar que, en general, la sociedad y los centros urbanos no están preparados para las inundaciones y grandes volúmenes de precipitación pluvial.

Palabras clave: Leptospirosis; Inundaciones; Ambiente; Desastres ambientales; Salud.

INTRODUCTION

In recent years, environmental issues have gained centrality in academic, legal, political, and social discussions, mainly due to their importance in relation to global factors such as global warming, climate change, the greenhouse effect, air pollution, the ozone layer hole, and biodiversity loss. Additionally, local environmental problems, such as the degradation of water, soil, and air, as well as domestic and workplace environments, have significantly impacted human health.[1]

In Brazil, between the years 2023 and 2024, the southern region, especially the states of Rio Grande do Sul and Santa Catarina, has faced major environmental challenges, experiencing long periods of drought and/or periods of extremely high rainfall concentrated in certain areas, causing floods in the region. In this context, diseases such as leptospirosis increase the risks of infection/transmission.

These risks, related to climate change and floods that result from it, are confirmed in other Brazilian regions by different academic studies. De Paula, Avelar and Bilotta[2] observed strong correlation between environmental disasters and the incidence of leptospirosis. Likewise, Silva et al.[3] confirmed that the seasonality of leptospirosis cases is strongly associated with increased rainfall. Portela, Kobiyama and Goerl[4] corroborate this aspect highlighting that the peaks of leptospirosis occur after peaks of rainfall. Therefore, these findings show similar behavior between the occurrence of rainfalls and the environmental disasters.

This article aims to understand the impacts of the May 2024 floods in the occurrence of leptospirosis in the health of the population in Rio Grande do Sul. About the zoonose (infectious disease transmitted between people and animals), leptospirosis is an acute

Este artigo pretende compreender quais são os impactos das enchentes de maio de 2024 nas ocorrências de leptospirose na saúde da população gaúcha. Regarding zoonosis (an infectious disease transmitted between humans and animals), leptospirosis is an acute febrile infectious disease transmitted through exposure to the urine of animals, especially rats, infected by the bacterium Leptospira. Infection occurs through mucous membranes or skin immersed for long periods in contaminated water,[5,6] with significant sanitary, economic, and social impacts due to its high incidence rate, especially in more vulnerable urban areas.

The proliferation of leptospirosis is directly related to environmental factors such as high rainfall rates and soil contaminated with organic matter. Additionally, infrastructural factors, such as investment in basic sanitation, education, and healthcare, are extremely important for minimizing the disease's impact on public health.

METHODS

The study, using a quantitative approach and descriptive statistical analysis, examined the incidence of infections and deaths from leptospirosis during the environmental disaster related to the floods that occurred in the state of Rio Grande do Sul in May 2024. As already highlighted in the introductory section, environmental disasters and floods are catalysts for diseases, which therefore justifies the definition of the time frame for the data presented and analyzed here.

The empirical material of the study was based on data made available on the official portal of the State Government of Rio Grande do Sul.[7] The latest update of the data (all used in this research according to the defined time frame) was carried out on May 28, 2024. Thus, the data analyzed in this article cover the period from May 1, 2024, to May 28, 2024 — a period of high rainfall rates — and no updated data provided by the State Government up to the present date were excluded.

Regarding quantitative research, it is characterized as an investigative method aimed at the collection and analysis of numerical data used to measure variables, with numbers therefore taking center stage.[8] In this type of research, different techniques are used to quantify information, emphasizing logical reasoning in data analysis, from which inferences about the investigated phenomenon are drawn. The compiled data were analyzed from the perspective of descriptive statistics, which is characterized as a method that provides quantitative statistical information in the form of data description and survey. Descriptive statistics, supported by tables and graphs, enable the systematization of datasets of the same nature, providing a broader understanding of their variation.[9]

RESULTS AND DISCUSSION

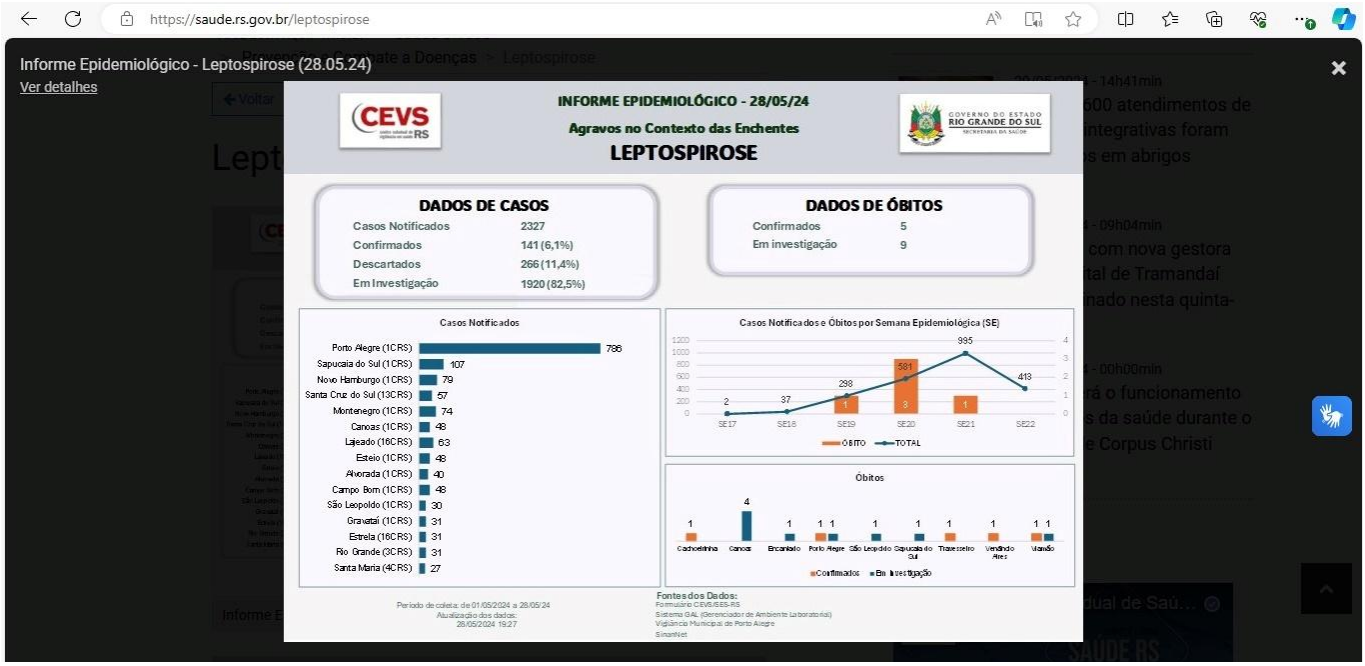
The data were collected between May 20 and May 29, 2024. As of May 29, 2024, according to the official portal of the State Government of Rio Grande do Sul, between May 2 and May 28, 2024, a total of 141 cases of leptospirosis infection and 5 deaths resulting from the disease were confirmed. The deceased included a 33-year-old man from Venâncio Aires, a 67-year-old man from the municipality of Travesseiro (Vale do Taquari region), a 56-year-old man from the municipality of Cachoeirinha, a man residing in Porto Alegre, and the last recorded victim, a man from Viamão. Some areas of these municipalities were severely affected by the floods that occurred in May 2024.[7]

The data on deaths show that, up to the time of the temporal cut-off, only men have died from the disease, thus constituting the predominant component of the epidemiological profile of leptospirosis in Rio Grande do Sul. In line with this, Oliveira et al.[10] found that men represent 83.33% of the infections. Magalhães, Mendes, and Melo[11] highlight that in Brazil, 79.6% of the cases occur in men, and Freitas et al.[12] indicate that in the state of Pará, the predominance of the disease in men represents 85%.[11]

The predominance of infections and deaths in men is likely associated with the particular characteristics of the male sex. Men are recognized for performing more challenging and hazardous professional activities than women, making them the group/gender most exposed in order to protect their families and assist the community during environmental disasters, taking responsibility for rescuing everyone and placing them in a safe location. Women, on the other hand, along with children and the elderly, are prioritized and preserved in these situations/incidents.[11] Consequently, men have a higher potential for deaths from leptospirosis, confirming the data from this research.

Furthermore, based on the available data, as shown in Figure 1, up until the present date (May 29, 2024), there have been 2,327 reported cases of leptospirosis infection, of which 266 (11.4%) were discarded and 1,920 (82.5%) are still under investigation.[13] In this regard, it is important to highlight that of the 2,327 reported cases, 786 are exclusive to the city of Porto Alegre, the state capital, representing 33.77% of the total notifications. Porto Alegre also accounts for 20% of the total deaths during this period.[13] It is worth noting that Porto Alegre is one of the cities that remained submerged for the longest period and had a large area of flooding. In this sense, in addition to the factor of population density, the duration of submersion significantly contributed to the high infection and death rates from the disease. On the other hand, it is important to mention that the epidemiological report available on the state's platform does not provide information on the epidemiological profile.

Furthermore, it is important to highlight that the data published by the State Government of Rio Grande do Sul were posted/updated daily, every day, as an epidemic report related to the floods. Thus, this data from May is directly related to the floods that occurred in the state, as emphasized by the Government itself.



Source: Rio Grande do Sul State website.

Figure 1. Epidemiological Report – Leptospirosis.

The epidemiological report shows that population density is a predominant factor in the reported cases of the disease. This reality corroborates the findings of Magalhães, Mendes, and Melo[11] and Oliveira *et al*.,[10] who found that, in most cases, leptospirosis infections predominate in urban areas, within households, and in regions with high population density.

From another perspective of analysis, comparing with the data from the year 2023, which recorded 477 cases and 25 deaths (for the year),[14] it is possible to observe an exponential increase in leptospirosis infections, as well as a significant rise in deaths from the disease during the floods of May 2024. Based on the temporal cut-off of this study (May 2024) and the estimated monthly average from 2023, there is a significant increase in both cases and deaths, as shown in the data presented in Table 1.

Table 1. Incidence of leptospirosis in 2023 and in May, 2024.

2023		**2024 (May 2 to May 28, 2024)**	
Cases	Deaths	Cases	Deaths
477	25	141	5
Monthly average (30 days)	**Monthly average (30 days)**	**Average (proportional to 30 days)**	**Average (proportional to 30 days)**
39.75	2.08	141	5

Source: developed by the authors based on the data available on the official page of the State Government of Rio Grande do Sul.

Based on the presented data, there is an exponential increase in infections and deaths from leptospirosis, with approximately 350% more infections and approximately 150% more deaths from the disease, considering the data proportional to 30 days for May 2024, compared to the estimated monthly average of 2023. For a better understanding of the results from the disaster of the May floods, from January to April 19 (2024), 129 cases of infection and 6 deaths were recorded, according to data from the State Government of Rio Grande do Sul and the Ministry of Health.[14] In this sense, the data from the flood period, which corresponds to a time frame of less than 30 days, show a drastic increase in the infections recorded during the first 4 months of the year, and almost reach the same number of deaths from the disease in the mentioned four-year period.

"This reality corroborates data from other regions of Brazil affected by floods. The research by Pereira Silva et al.,[15] for example, found that in Santa Catarina — a state that in recent months has also been affected by floods — the highest rates of leptospirosis occur in the same month or the following month after heavy rains, thus serving as a key indicator for understanding the incidence of the disease, planning, and prevention. In line with this, De Paula, Avelar, and Bilotta[2] point to a direct correlation between floods and leptospirosis; they also confirm that the seasonality of cases is strongly associated with increased rainfall and environmental disasters.

It is important to consider that, due to the limitation of information on leptospirosis occurrences in Rio Grande do Sul, such as the unavailability of monthly records for the year 2023 (and 2024), we are unable to perform more precise statistical tests, with standard deviation and other variables. Consequently, the monthly average for 2023 is an estimated average, without standard deviation.

However, as per the objective of the research, it is possible to understand, from the analyzed data, that the floods radically harmed the health of the population of Rio Grande do Sul, with regard to leptospirosis infections, significantly increasing both occurrences and deaths during the period. The analyzed data, corroborated by other academic studies, remain significant/relevant even amidst the limitations of the statistical analysis process.

Finally, deaths from leptospirosis also account for about 3% of the total deaths (169) from the floods in the state, according to the latest report presented by the State Civil Defense on the May 2024 floods, in the updated flood balance, as of the most recent data reviewed by this research, according to the temporal cut-off.[7]

CONCLUSION

The study, with a quantitative approach based on the descriptive statistical method, investigated the incidence of infections and deaths from leptospirosis during the environmental disaster related to the floods that occurred in the state of Rio Grande do Sul in May 2024.

The empirical material, collected from the State Government portal, revealed that the environment (as well as climate and environmental changes) is directly related to people's health and the incidence of diseases, depending on the type of environment. In other words, the environmental context is a predominant factor for the health of the population.

The case of the floods in Rio Grande do Sul demonstrates the potential for an increase in disease occurrences and deaths in people's health due to environmental disasters. In this regard, we observed an alarming increase of approximately 350% in infections and 150% in deaths from leptospirosis during the period, considering the data proportional to 30 days for May 2024, compared to the estimated monthly average for the year 2023.[16,17]

The data recorded from the May flood, compared to the occurrences registered up until April (from January to April), represent an increase of over 100% in infections and, similarly, an approximate 100% increase in deaths. The occurrences and deaths were so significant that deaths from leptospirosis account for approximately 3% of the total deaths from the floods in the state during the period.

Finally, based on this study, it is possible to understand the need for greater infrastructure investments and preventive actions to reduce the detrimental outcomes of environmental disasters. Although the article faces some analytical challenges due to the lack of information available on the search platform, it is clear that, generally, society and urban centers are not prepared for floods and large volumes of rainfall. Furthermore, these findings could contribute to guiding public health measures in the context of climate change and flooding.

ACKNOWLEDGMENTS

We would like to thank the Financial Assistance Program of the State of Santa Catarina – Free University, for its support of Higher Education.

CONFLICT OF INTERESTS

Nothing to declare.

AUTHORS' CONTRIBUTIONS

ASB: Concept, Data Curatorship, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – First Draft, Writing – Review and Editing. AR: Concept, Data Curatorship, Formal Analysis, Supervision, Validation, Writing – Review and Editing.

REFERENCES

1. Pignatti MG. Saúde e ambiente: as doenças emergentes no Brasil. Ambient Soc 2004;7(1):133-148. https://doi.org/10.1590/S1414-753X2004000100008
2. De Paula DS, Avelar KES, Bilotta P. Impacto das Mudanças Climáticas e da Pandemia na Ocorrência de Casos de Leptospirose no Estado do Rio de Janeiro. Front, J Soc, Technol Environ Sci. 2024;13(1):21-39. https://doi.org/10.21664/2238-8869.2024v13i1.p21-39
3. Silva TR, Meirelles-Bartoli RB, Blankenheim TM, Santos RF, Martins AV, Ramos DGS, *et al*. Alterações pluviométricas e incidência da leptospirose em humanos no Estado de Minas Gerais, Brasil, de 2001 a 2017. Res Soc Dev. 2021;10(1). http://dx.doi.org/10.33448/rsd-v10i1.12089
4. Portela FC, Kobiyama M, Goerl RF. Panorama brasileiro da relação entre leptospirose e inundações. Geosul 2020;35(75):711-34. https://doi.org/10.5007/1982-5153.2020v35n75p711
5. Queiroz C. Como fazer todos os diagnósticos: um guia para emergência e clínica médica. Salvador, BA: Sanar; 2020.
6. Guedes DP, Braga KL, Silva ML, Medeiros RL. Diagnóstico e tratamento de pacientes com leptospirose no Brasil: revisão da literatura. Id on Line Rev Mult Psic. 2020;14(53):706-17. https://doi.org/10.14295/idonline.v14i53.2800
7. Governo do Estado do Rio Grande do Sul. Defesa Civil atualiza balanço das enchentes no RS - 27/5, 18h [Internet]. Porto Alegre; 2024 [accessed on Jun. 5, 2024]. Available at: https://www.estado.rs.gov.br/defesa-civil-atualiza-balanco-das-enchentes-no-rs-27-5-18h
8. Flick U. Introdução a metodologia da pesquisa: um guia para iniciantes. Porto Alegre, RS: Penso; 2013.
9. Reis E. Estatística descritiva. 4. ed. Lisboa: Silabo; 1998.
10. Oliveira WL, Ernandes BGR, Sousa CL, Dantas S, Cruz JR. Aspectos epidemiológicos dos casos de leptospirose notificados em um município do interior da Amazônia Ocidental. R. Saúde Públ. 2023;6(2):1-11. https://doi.org/10.32811/25954482-2023v6n2.681
11. Magalhães FAC, Mendes RM, Melo ALT. Análise descritiva dos casos confirmados de leptospirose em humanos no Brasil, período de 2010-2019. J Health NPEPS. 2021;6(1):232-43.
12. Freitas MS, Seleski D, Chalkidis H, Silva W, Junior R. Retrospectiva descritiva da prevalência do gênero, grupo etário e critério de confirmação dos casos de leptospirose no Estado do Pará. Rev Bras Hig Sanid Anim. 2021;15(3):1-11.
13. Governo do Estado do Rio Grande do Sul. Secretaria da Saúde. Leptospirose [Internet]. Porto Alegre; 2024 [accessed on Jun. 5, 2024]. Available at: https://saude.rs.gov.br/leptospirose
14. Governo do Estado do Rio Grande do Sul. Mais dois óbitos por leptospirose são confirmados no Estado [Internet]. Porto Alegre; 2024 [accessed on Jun. 5, 2024]. Available at: https://estado.rs.gov.br/mais-dois-obitos-por-leptospirose-sao-confirmados-no-estado-6657c7768dd44
15. Silva AEP, Latorre MRDO, Chiaravalloti Neto F, Conceição GMS. Tendência temporal da leptospirose e sua associação com variáveis climáticas e ambientais em Santa Catarina, Brasil. Ciênc Saúde Coletiva. 2022;27(3):849-60. https://doi.org/10.1590/1413-81232022273.45982020
16. O Globo. Enchentes no RS: sobe para cinco o número de mortes por leptospirose [Internet]. Rio de Janeiro; 2024 [accessed on Jun. 5, 2024]. Available at: https://oglobo.globo.com/brasil/sos-rio-grande-do-sul/noticia/2024/05/27/enchentes-no-rs-sobe-para-cinco-o-numero-de-mortes-por-leptospirose.ghtml
17. Governo do Estado do Rio Grande do Sul. Confirmado segundo óbito por leptospirose relacionado às enchentes [Internet]. Porto Alegre; 2024 [accessed on Jun. 5, 2024]. Available at: https://estado.rs.gov.br/busca?palavraschave=leptospirose&periodoini=21%2F11%2F2021